National Institute of Environmental Health Sciences

Climate change and fisheries: Assessing the economic impact in Iceland and Greenland

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Abstract:

ABSTRACT. . Climate changes in the 21st century are expected to significantly increase ocean temperatures and modify other oceanographic conditions in the North Atlantic. Marine biological research suggests that the impacts on the commercially most important fish stocks in the Icelandic-Greenland ecosystem may well be quite substantial. This will obviously lead to a corresponding impact on the economies of these two countries. However, the timing, extent and biological impact of global warming is quite uncertain. As a result the economic impact is similarly uncertain. This paper attempts to provide estimates of the impact of altered fish stocks due to global warming on the Icelandic and Greenland economies. The approach is one of stochastic simulations. This involves essentially three steps. The first is to obtain predictions of the impact of global warming on fish stocks and the associated probability distribution. For this we rely on recent marine biological predictions. The second step is to estimate the role of the fisheries sector in the two economies. This is done with the help of modern econometric techniques based on economic growth theory and historical data. Obviously these estimates are also subject to stochastic errors and uncertainty. The third step is to carry out Monte Carlo simulations on the basis of the above model and the associated uncertainties. The result of the Monte Carlo simulations consists of a set of dynamic paths for GDP over time with an expected value and a probability distribution for each future year. On this basis it is possible to calculate confidence intervals for the most likely path of GDP over time. The results indicate that the fisheries impact of global warming on the Icelandic GDP is more likely to be positive than negative but unlikely to be of significant magnitude compared to historical economic growth rates and fluctuations. The uncertainty of this prediction, however, is large. For Greenland, the impact on fish stocks and the GDP is highly likely to be positive and quite substantial relative to the current GDP. Due to less knowledge of the relationship between the fisheries sector and the Greenland economy, however, the confidence interval of this prediction is even wider than in the case of Iceland.

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Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Ecosystem Changes, Food/Water Security

Food/Water Security: Fisheries

Geographic Feature:

resource focuses on specific type of geography

Ocean/Coastal

Geographic Location:

resource focuses on specific location

Non-United States

Non-United States: Europe, Non-U.S. North America

European Region/Country: European Country

Other European Country : Iceland

Health Impact:

specification of health effect or disease related to climate change exposure

Health Outcome Unspecified

Mitigation/Adaptation:

mitigation or adaptation strategy is a focus of resource

Adaptation

Model/Methodology:

type of model used or methodology development is a focus of resource

Cost/Economic, Exposure Change Prediction

Resource Type:

format or standard characteristic of resource

Research Article

Timescale:

time period studied

Long-Term (>50 years)

Vulnerability/Impact Assessment:

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content